

Remarks

Claims 1, 5, 8, 17, 19 and 20 have been amended and claims 4, 6 and 7 have been cancelled. Accordingly, claims 1-3, 5 and 8-22 are currently pending.

I. Amendments:

Claim 1 was amended to recite that the cellulose non-reactive sizing agent is selected from the group consisting of copolymers of styrene or substituted styrene with at least one other kind of ethylenically unsaturated monomer and that the emulsifier is selected from the group consisting of oxyalkylene phosphate esters and salts thereof. Support for the amendments can be found in original claims 4 and 7. Accordingly, no new matter has been added.

Claims 5, 8, 17, 19 and 20 were amended to be consistent with amended claim 1. Claim 5 was also amended to recite that Q is PO(OH). Support can be found in original claim 6. No new matter has been added.

II. The Invention:

The present invention relates to an aqueous dispersion useful for internal or surface sizing, as well as preparation and use thereof in the production of paper. The aqueous dispersion includes at least one cellulose reactive sizing agent selected from the group consisting of ketene dimers and multimers, at least one cellulose non-reactive sizing agent (claim 20) and specifically such a sizing agent selected from the group consisting of copolymers of styrene or substituted styrene with at least one other kind of ethylenically unsaturated monomer (claims 1, 5, 8, 17 and 19), and at least one emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof.

It has been found that effective internal and surface sizing can be achieved by using a dispersion comprising both a ketene dimer or multimer and a cellulose non-reactive sizing agent, and that high stability of such dispersions can be obtained by including a special kind of emulsifier, namely, an oxyalkylene phosphate ester or a salt thereof.

Examples 1 and 2 of the present application show that the present sizing dispersion gives considerably improved sizing efficiency than conventional internal or surface sizes. Examples 3 and 4 further show that the present sizing dispersion has improved stability and particle size distribution, due to the presence of the emulsifier, as claimed.

III. Objections/Rejections:

The Oath/Declaration was objected to for not stating that the person making the oath acknowledges their duty under 37 CFR 1.56.

As the new Declaration and Power of Attorney has corrected the defect, it is submitted that the objection is now moot.

Claims 1, 5, 17 and 19-22 stand rejected, under 35 U.S.C. §102(e), as being anticipated by Holmberg et al (US 6,692,560). The Applicant respectfully traverses.

The Office Action contends that Holmberg et al disclose a composition comprising "a non-cellulose reactive sizing agent and/or a cellulose reactive sizing agent". Applicants respectfully disagree.

Applicants respectfully submit that Holmberg et al mention examples of non-cellulose reactive sizing agents and cellulose reactive sizing agents that can be used in the disclosed composition, but fail to see any indication whatsoever that a composition could include both a non-cellulose reactive sizing agent and a cellulose reactive sizing agent.

Furthermore, Holmberg et al do not disclose any oxyalkylene phosphate ester emulsifier as recited in the now amended claims.

Accordingly, it is respectfully requested that the rejections of claims 1, 5, 17 and 19-22 under 35 U.S.C. § 102(e), as being anticipated by Holmberg et al, be withdrawn.

Claims 1 - 22 stand rejected under 35 U.S.C. § 103(a), as being obvious over Frölich et al (US 6,306,255), in view of Wendel et al (US 4,051,093) and Holmberg et al. The Applicant respectfully traverses.

Frölich et al disclose a sizing composition comprising a cellulose-reactive sizing agent and a hydrophobically modified dispersing agent, and optionally a non-cellulose reactive sizing agent. Claim 1 of the present application is distinguished from Frölich et al by the presence of an emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof, which has been found to solve the problem of providing a dispersion of high stability.

Wendel et al disclose a copolymer emulsion which may be used as a sizing agent for paper (column 6, lines 13-14; claim 1). Wendel et al disclose a number of conventional cationic,

anionic, amphoteric and non-ionic emulsifiers (column 5, lines 2-24). Wendel et al do not disclose, teach or suggest a combination of a cellulose reactive sizing agent selected from ketene dimers or multimers and a cellulose non-reactive sizing agent.

Holmberg et al disclose a composition comprising a sizing agent, however Applicant submits that he are unaware of any disclosure of using two different sizing agents and particularly not a combination of ketene dimers or multimers with copolymers of styrene or substituted styrene, as claimed. Furthermore, Applicant is unaware of any disclosure to use an oxyalkylene phosphate ester or a salt thereof as an emulsifier, as claimed.

The Office Action contends that, in view of Wendel et al and Holmberg et al, it would have been obvious to a person skilled in the art to use the claimed emulsifier in the dispersion of Frölich et al. Applicant respectfully disagrees and submits that one skilled in the art would not have any reason to select the emulsifiers in combination with the present sizing agents, as presently claimed, based on the combined teachings of Frolich et al, Wendel et al and Holmberg et al.

In that regard, Frolich et al suggest using any of a number of different emulsifiers with the cellulose-reactive sizing agent, with the proviso that the emulsifier has been hydrophobically modified, but none of which include the claimed emulsifiers. Similarly, Wendel et al suggest using any number of different emulsifiers in connection with performing the emulsion polymerization reaction to form the copolymer emulsion and teaches that a cationic emulsifier is preferred (See col. 5, line 4).

In response to Applicants prior arguments, the Office Action contends that "there is no explanation or reason [given by Applicant] to guide one of ordinary skill in the art away from several species of nonionic, anionic and amphoteric emulsifiers that are also recited." Applicant respectfully submits that the Office Action is improperly attempting to shift the burden to Applicant to provide a reason why one skilled in the art would not have selected particular species from the broad ranges of species disclosed in the prior art. Applicant respectfully submits that it is the burden of the Office Action to identify a reason that would have prompted a person of ordinary skill in the art in the relevant field (at the time of the invention) to combine the prior art elements in the manner presently claimed.

It is respectfully submitted that the cited references merely disclose the possibility of using any emulsifier selected from a broad range of different emulsifiers, as discussed above, without any suggestion to modify their teachings to arrive at the claimed invention. A "determination of

obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *Crown Operations*, 62 U.S.P.Q.2d at 1922 (*quoting ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546, 48 U.S.P.Q.2d 1321, 1329 (Fed. Cir. 1998)). There must be a teaching or suggestion in the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. *Id.* at 1922. In *Grain Processing Corp. v. American Maize-Products Co.*, 840 F.2d 902, 907 (Fed. Cir. 1988), the Federal Circuit warned that care must be taken to avoid hindsight reconstruction by using the present application as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claimed invention.

The Office Action cites *In re McLaughlin*, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971), apparently for the proposition that as long as each element of the claims were in the prior art, a hindsight reconstruction is proper. Applicant respectfully submits that *In re McLaughlin* should not be read so broad and to the extent it can be interpreted to conflict with the above cited Federal Circuit cases, it has been effectively overruled by the Federal Circuit.

Regarding the instant case, Applicant submits that there is no reason based on the cited references to combine them in the manner presently claimed and the only reason one skilled in the art would arrive at the presently claimed invention is using the present application as a blueprint. In that regard, Applicant submits that ketene dimers and multimers are structurally quite different from copolymers of styrene or substituted styrene and a person of ordinary skill in the art would have no reason to expect that an emulsifier efficient for styrene polymers would be efficient also for ketene dimers and multimers and particularly not for a mixture of the two different kinds of sizing agents.

Applicant respectfully submits that, in order to obtain the dispersion as presently claimed, which includes using specific emulsifiers for the claimed dispersion (that includes both the specific cellulose reactive and cellulose non-reactive sizing agents), one would have to pick and choose individual aspects from the various teachings in the cited references and then select the specific claimed emulsifier, in the absence of any teachings or suggestions to do so. It is respectfully submitted that the only way to accomplish this, is with the improper use of hindsight.

Although Frölich et al disclose a combination of a cellulose-reactive sizing agent and cellulose non-reactive sizing agent, Applicant respectfully submits that there is no teaching or suggestion that a dispersion of high stability could be obtained by selecting an emulsifier as

presently claimed. It is further submitted that there is no guidance on how to select an emulsifier from among the thousands of emulsifiers known per se, including those mentioned in Wendel et al, in order to provide a stable dispersion, as claimed.

Wendel et al disclose among other emulsifiers anionic emulsifiers such as alkyl sulfates, alkyl-sulfonates and alkyl-phosphates which may be in the form of adduct with ethylene oxide (column 5, lines 12-15). However, Applicant respectfully submits that there is no teaching or suggestion that oxyalkylene phosphate esters or salts thereof would be suitable for stabilizing a dispersion that includes both a ketene dimer or multimer and a cellulose non-reactive sizing agent.

Wendel et al teach that it is not necessary to have emulsifiers present in the process of emulsion polymerization in an aqueous medium containing conventional polymerization initiators to obtain shear-resistant emulsions (column 4, line 65- column 5, line 2). Wendel et al further teach that cationic emulsifiers are preferable, such as salts of fatty amines (column 5, line 4). However, Applicant has found that use of an emulsifier, as claimed, results in an unexpected improvement in stability of the dispersion compared to use of only a salt of a fatty amine. See Example 3, where use of a polyoxyethylene phosphate ester improved stability of the dispersion compared to using just a ditallow dimethyl ammonium chloride. Moreover, a person of ordinary skill in the art would have no reason to expect any improved effect of combining the two different kinds of sizing agents, as demonstrated in Examples 1-2 in the present specification.

The Office Action indicates that the results (in the present examples) are not commensurate in scope with the broadly claimed subject matter. Applicant respectfully submits that with the further specification of the cellulose non-reactive sizing agent and the emulsifier, the unexpected results are commensurate in scope with the present claims.

Applicant respectfully submits that the cited references, when read as a whole do not, disclose, suggest or teach that it would be possible or desirable to select an emulsifier, as presently claimed, for stabilizing a dispersion that includes both a ketene dimer or multimer and a styrene cellulose non-reactive sizing agent. Therefore, it is respectfully submitted that the presently claimed invention is not obvious in view of these cited references.

Accordingly, it is respectfully requested that the rejections of claims 1-22 under 35 U.S.C. § 103(a), as being obvious over Frolich et al., in view of Wendel et al and Holmberg et al, be withdrawn.

IV. Conclusion:

In light of the foregoing, Applicant respectfully submits that the application as amended, including claims 1-3, 5 and 8-22, is now in proper form for allowance, which action is earnestly solicited. If the Examiner has any questions relating to this Amendment or to this application in general, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,



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